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FUSRAP PROJECT - JOB 14501
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SUBJECT Characterization Plan for Vicinity Properties
Adjacent to Dlaty Ave.
FROM P. Crotnell TO S. Shunda
COMM DATE 2 12 87 ADDR CODE _____ CLOSING CCN _____
SUBJECT CODE 7310 WBS 140
AFFECTED DOCUMENT #140CPV

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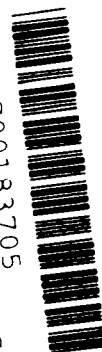
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Bechtel National, Inc.

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FEB 12 1987

U. S. Department of Energy
Oak Ridge Operations
Post Office Box E
Oak Ridge, Tennessee 37831

Attention S. W. Ahrends, Director
Technical Services Division

Subject: Bechtel Job No. 14501, FUSRAP Project
DOE Contract No. DE-AC05-81OR20722
Characterization Plan for Vicinity Properties
Adjacent to Latty Avenue
Code: 7310/WBS: 140

Dear Mr. Ahrends:

Characterization of the properties adjacent to Latty Avenue is necessary to determine the horizontal and vertical boundaries of radioactive contamination that exceeds remedial action guidelines and to quantify the magnitude of the contamination. These factors will affect the design engineering for remedial action. Information collected during the characterization will also allow evaluation of disposal alternatives. This letter is intended to document the scope of the characterization effort and the procedures to be used. The properties are located in the cities of Hazelwood and Berkeley, Missouri.

In September 1983, Oak Ridge National Laboratory (ORNL) performed a preliminary survey of properties adjacent to and in the vicinity of the Hazelwood Interim Storage Site (HISS) to determine if contamination in excess of guidelines was present. The potentially contaminated areas identified during that preliminary evaluation were more thoroughly surveyed by ORNL during January and February 1984. The results of this survey are contained in Reference 1.

The results of the ORNL survey demonstrated that radioactive contamination was present in all areas of the construction corridor along Latty Avenue, extending north and south in some areas onto adjacent private properties. ORNL discovered redistribution of the contamination due to flooding, surface runoff, and road and utility line activities. The major contaminant was thorium-230.

CONCURRENCE

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Based on the ORNL characterization, in 1984, Bechtel National, Inc. (BNI) performed remedial action on the contaminated areas within the cities' temporary slope and construction line (TSCL) (Ref. 2). The TSCL includes all areas that could potentially be disturbed during the drainage improvement project. During the remedial action, contamination exceeding guidelines was found to extend beyond the TSCL. To find the boundaries of contamination, this characterization effort includes properties adjacent to Latty Avenue that are beyond the TSCL.

In 1986 the Department of Energy (DOE) requested BNI to provide radiological support coverage for the cities of Hazelwood and Berkeley during their road improvement project. During this coverage, radium-226 and thorium-230 contamination in excess of DOE remedial action guidelines was discovered at depths apparently ranging from 2 to 8 ft along and under Latty Avenue. Based on gamma count rates, material which exhibited contamination in excess of remedial action guidelines was removed and placed at the HISS for interim storage. Soils which did not exhibit elevated gamma readings were used as fill material along the entire length of Latty Avenue. Based on these recent findings, further characterization along the shoulders and under Latty Avenue is required.

RADIOLOGICAL CHARACTERIZATION METHODOLOGY

The characterization approach is to define the horizontal and vertical boundaries of the radiological contamination existing along Latty Avenue. No characterization will be done on areas beyond this limit. The approach discussed with the Independent Verification Contractor (IVC) assumes that the remaining areas of the properties are not contaminated.

Radiological characterization has the projected start date of early March 1987, with the completion of field work scheduled for May 1987. A detailed characterization report for the properties adjacent to the HISS and to Latty Avenue is scheduled for publication in September 1987. Individual activities designed to cost-effectively accomplish the characterization are identified in the checklist in Appendix A. The following information provides additional detail associated with particular activities in the checklist.

Support Services

A civil surveyor will establish a 50-ft grid over the shaded area indicated in Figure 1. The grid origin used during the 1984 remedial action along the Latty Avenue right-of-way will be reestablished. The grid will be tied to the Missouri state grid system with sufficient detail to allow reestablishment of the grid at some future date. All property lines will be located

and set. A drawing showing the property lines, fences, roads, gravel, asphalt, surface obstructions, landmarks, grid intersections, and other features will be provided by the surveyor. This drawing will help identify surface obstructions and ground elevations, as well as problem areas that will significantly affect the cost of remedial action. A subcontract will be required for drilling services.

Surface Characterization

Surface characterization will precede subsurface investigations so that an understanding of contamination patterns is gained before biased sampling locations are selected. Surface characterization will consist of the activities listed below.

- o Walkover surveys will be performed that consist of gamma radiation scans of accessible 50-ft by 50-ft grid blocks. Areas in which readings exceed twice normal background levels will be marked on a site drawing. The walkover survey covers all accessible ground surface and ensures that hotspots between grid points are detected. Walkover surveys of areas previously characterized will be repeated to provide an indication of any spread of contamination since the preceding survey.
- o Cone-shielded gamma scintillometer measurements will be made at no greater than 12.5-ft intervals in accessible areas of contamination identified during the walkover survey. These measurements will minimize any discrepancy in the size of a given area that might have been created by lateral gamma flux (shine) from other contaminated areas nearby. Data obtained from this survey will permit refinement of the boundaries of contaminated areas established on the basis of the walkover scans.
- o Gamma exposure rate measurements will be made 3 ft above the surface at selected grid points using a pressurized ionization chamber (PIC). These measurements will be used to determine field calibration factors for the 2-in. by 2-in. sodium iodide (NaI) gamma scintillation detectors. The factors allow conversion of measured count rates to an exposure rate for direct comparison with DOE guidelines.
- o Surface soil samples (0 to 6 in.) will be collected from selected locations on systematic spacing (i.e., at every 50-ft grid intersection). Samples will be analyzed for uranium-238, thorium-230, radium-226, and thorium-232. Since thorium-230 analyses are costly, the number of these samples will be minimized. Biased samples may be collected from areas requiring further definition. All

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samples will be archived and will be analyzed on an "as-needed" basis to refine the boundaries of contamination.

Subsurface Investigation

The subsurface investigation will be conducted by drilling boreholes at most 100-ft grid intersections. In areas associated with the new storm sewer line, drilling will be conducted at 50-ft intervals. Biased locations will also be chosen (contingent on funding) to gain additional information from areas of suspected contamination to reduce uncertainties in the waste volume estimates. At least one hole will be drilled in each area where elevated surface radioactive contamination is found so that the depth of the contamination can be determined. All boreholes will be gamma logged.

All boreholes will be sampled in 1-ft increments from the surface to the bottom of the borehole. Previous experience has shown that the concentration of thorium-230 typically exceeds the concentration of radium-226 by a factor of at least 5. It is therefore reasonable to assume that a thorium-230 concentration exceeds the guideline as long as radium-226 is detectable using the gamma scintillometer. Based on this reasoning, the soil samples collected from a given borehole will not be analyzed for thorium-230 if the gamma spectrometry analysis indicates that contamination levels are greater than 15 pCi/g. Analysis for the presence of thorium-230 will be performed on successively deeper samples until results indicate that its concentration is less than 15 pCi/g. For boreholes where the gamma scan does not indicate any contamination, the surface soil sample will be analyzed.

DOCUMENTATION

All data collected during the survey will be transmitted to the BNI Oak Ridge office via the Thermo Analytical/Eberline (TMA/E) Oak Ridge office in an approved format (graphically whenever possible). Before the start of field activities, the field team will be provided with blank grid drawings on which to plot field measurements. The field team will assign a scale to the grid blocks, which will permit later interpretation of the drawings. These drawings will show:

- o Surface walkover scan findings in the form of grid blocks showing radiation levels greater than twice background
- o All cone-shield readings in counts per minute
- o Locations of drilled holes with identification numbers corresponding to gamma logs and soil samples

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- o Sketches (to rough scale) of surface obstructions, irregularities, drainage pathways, culverts, fences, roads, landmarks
- o Locations of PIC measurements

A radiological characterization report will be prepared to present the data collected and an interpretation of the results. The main objectives of the report will be to present the current radiological conditions of the vicinity properties adjacent to Latty Avenue and to provide an evaluation of these conditions relative to the design and construction of a waste containment facility.

REFERENCES

1. Oak Ridge National Laboratory. Radiological Survey of Latty Avenue in the Vicinity of the Former Cotter Site, Hazelwood/Berkeley, Missouri (LM001), Draft, Oak Ridge, TN, September 1986.
2. Bechtel National, Inc. Post-Remedial Action for the Hazelwood Site - 1984, DOE/OR/20722-76, Oak Ridge, TN, September 1985.

If you have any questions concerning this proposed plan, please contact Karen Noey at 576-0462.

Very truly yours,


G. P. Croswell
Project Manager - FUSRAP

KN/mp

Attachment: Appendix A

cc: S. H. McCracken
J. F. Wing
B. A. Hughlett
J. Berger - ORAU
B. A. Berven - ORNL
J. F. Nemec

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APPENDIX A
RADIOLOGICAL CHARACTERIZATION CHECKLIST
FOR VICINITY PROPERTIES ADJACENT TO LATTY AVENUE

Action	Completed	
	Initials	Date
1. Review of Historical Information		
a. previous radiation surveys	_____	_____
b. operations descriptions	_____	_____
c. photos	_____	_____
d. interviews		
1) operations personnel (hire as consultants?)	_____	_____
2) neighbors	_____	_____
3) others	_____	_____
e. Aerospace Research resources	_____	_____
f. others	_____	_____
2. Property Surveys		
a. obtain blank grid drawings	_____	_____
b. obtain old and new topographical drawings	_____	_____
3. Walkover Tour of Site (note on drawings)		
a. rubble	_____	_____
b. surface obstructions	_____	_____
c. buried utility lines	_____	_____
d. utility poles	_____	_____
e. culverts	_____	_____
f. stockpiles	_____	_____
g. grates, drains	_____	_____
h. others (wells, etc.)	_____	_____

4. Review of Preliminary Information

- a. compare old and new topographic maps for changes
- b. develop sketch of site from historical information

5. Surface Gamma Surveys

- a. walkover with unshielded gamma scintillometer
- b. cone-shielded gamma survey at grid subdivisions

6. Review Gamma Scans

- a. map areas exceeding preselected limits with unshielded scan
- b. map areas exceeding preselected limits with cone-shield results
- c. check consistency of surface scans with historical information
- d. plan locations for biased surface soil samples
- e. plan locations for systematic boreholes
- f. plan locations for sampling around Item 3 problem areas

7. Biased Surface Soil Sampling (as planned)

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8. Subsurface Investigations (as planned)

- a. drill systematic boreholes as explained in letter
- b. gamma log boreholes
- c. collect subsurface sample
- d. plan biased drilled borehole locations to resolve inconsistencies between systematic holes

9. Review Sampling
- a. were all planned samples collected? _____
 - b. were sufficient samples collected to
 - 1) establish background? _____
 - 2) calibrate cone shield? _____
 - 3) calibrate unshielded gamma walkover survey? _____
 - 4) calibrate borehole gamma logs? _____
 - c. were problem areas from Item 3 characterized?
 - 1) sides? _____
 - 2) bottoms? _____
 - 3) top? _____
 - d. was a hole drilled in each area of surface contamination? _____
 - e. identify all areas that are unmeasurable _____
 - f. graphically review data to ensure that all areas have been characterized _____
10. Review of Data for Consistency with Historical Information _____
11. Field Sample Collection Forms
- a. do coordinates on samples match those on forms? _____
 - b. are all samples on collection forms? _____
 - c. were all logged samples shipped? _____
 - d. was copy of field sample collection sent to TMA/E Oak Ridge office? _____
 - e. was copy of collection form sent with samples to laboratory? _____
12. Transmittal of all Field Notes, Data, and Drawings to TMA/E Oak Ridge Office _____

13. BNI/EH&S Interpretation of
Characterization Data

a. surface

- 1) develop surface contamination
isopleths
- 2) compare BNI and characterization
team isopleths

b. subsurface

- 1) correlate soil samples and
borehole gamma logs to determine
cpm/pCi/g
- 2) develop contamination isopleths
at various depths
 - a) map all borehole logs that
exceed criteria
 - b) map all borehole logs with
increasing trends regardless
of magnitude

14. Comparison of Contamination Limits and
Historical Information for Consistency

15. Transmittal of Data for Review to BNI
Engineering Department with Copies to
Construction and the Characterization Team

16. Site Tour to Review Characterization
Findings with

- a. lead health physicist
- b. lead engineer
- c. lead construction representative

